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THE ARSENAL SHIP MEASURES UP TO JOINT VISION 2010

by

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The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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Abstract of

THE ARSENAL SHIP MEASURES UP TO JOINT VISION 2010

The arsenal ship concept combines new and emerging technologies into a new type of naval platform capable of massive offensive firepower. Concentrating hundreds of advanced weapons in one platform will provide the Joint Force Commander with a potent yet simple instrument for mass, maneuver and precision fires, as well as a credible deterrence prior to the onset of armed conflict.

When measured against Joint Vision 2010, the Navy's Arsenal Ship Concept of Operations supports an effective joint fighting force for the early 21st century in most areas. More development is needed, however, in the areas of full-dimensional protection and command structure for the ship in the joint force. The arsenal ship's potential contribution to joint warfighting compels the most rigorous efforts to make the most efficient and effective use of this platform and protect it from the threats of future enemies.

THE ARSENAL SHIP MEASURES UP TO JOINT VISION 2010

The Revolution in Military Affairs which has touched nearly every aspect of military operations can perhaps best be illustrated by the development of the arsenal ship. This innovative ship design combines existing and emerging technologies with a new concept of weapons employment; the early and massive use of firepower to seize an immediate offensive advantage at the onset of armed conflict.¹ Not a naval combatant in the traditional sense, the arsenal ship will perform no command and control functions and will possess only very modest active defensive systems.² The primary roles for the ship will be deterrence through sustained forward deployment and overwhelming firepower for deep strike and interdiction available at the onset of war. Subsequent to the initial strike, the arsenal ship will be a ready source of precision fires for the joint force commander as well as an additional supply of theater air defense weapons.

As history teaches us, a successful military innovation lies not merely in technology, but in the marriage of

¹ "3-R Strategy" for Rapid, Robust Response as delineated by Ernest Blazar, "How the arsenal ship will fight," Navy Times, 29 July 1996, 14:2.

² U.S. Navy Dept., Arsenal Ship Concept of Operations (Washington: 1996), 4.

technology and sound operational doctrine.³ Just as earlier doctrinal advances assured the success of the aircraft carrier during World War II, thorough development and critical analysis of operating doctrine is essential if the arsenal ship is to succeed in the joint warfighting arena. Current plans envision the first demonstrator, or prototype, ship conducting sea trials in the year 2000,⁴ and the initial operational deployment as soon as the year 2004.⁵ Because the final design and full capabilities of the ship will not be known until early 1998, the Navy must continue to refine existing operating doctrine so that joint staffs will be prepared to include the new ship in their operational plans well before it appears in their force.

As detailed by the Navy, the arsenal ship concept fulfills the naval service's vision as expressed in Forward . . . From the Sea and Operational Maneuver From the Sea. The arsenal ship represents a fulfillment of the stated goals of using forward deployed sea-based platforms to influence events ashore in peacetime, and to provide swift, massive response

³ Stephen Peter Rosen, "New Ways of War: Understanding Military Innovation," International Security, Summer 1988, 134.

⁴ Ernest Blazar, "Future Shock: Arsenal ship will have small crew & big punch," Navy Times, 29 July 1996, 13:1.

⁵ Telephone conversation with CDR Cam Ingram, USN, Office of Chief of Naval Operations, Surface Warfare Plans, Programs and Requirements, Pentagon, Washington, DC, 9 January 1997.

and flexible support of ground forces in war.⁶ Some key weaknesses appear in the Navy's Concept of Operations (CONOPS), however, when measured against Joint Vision 2010, particularly in the areas of protection and unity of command. The Navy should more fully develop the full-dimensional protection concept and the command structure for the ship in joint operations. The Navy CONOPS should reflect continuing refinements and must always fully support joint doctrine if the arsenal ship is to achieve its potential of operational success by providing a key element to the joint force of the future.

BACKGROUND

The idea of a stealthy ship composed almost entirely of offensive weapons was first given public credence by VADM Joseph Metcalf III, USN (Ret.) in his "Revolution at Sea" of the mid-eighties. His overriding philosophy in conceptualizing a future strike cruiser was maximizing the delivery of "ordnance on target".⁷ Though it took some time for VADM Metcalf's vision to enjoy wide acceptance, the idea

⁶ U.S. Navy Dept., Forward . . . From the Sea (Pentagon, Washington: 1994), 2. and U.S. Marine Corps, Operational Maneuver From the Sea (Pentagon, Washington: 1996), 12.

⁷ VADM Joseph Metcalf III, USN (Ret.), "Revolution at Sea," U.S. Naval Institute Proceedings, January 1988, 38.

was delivered nearly intact to the Navy's design concept for the arsenal ship.

Because of the innovative procurement process being pursued by the Navy, in collaboration with the Defense Advanced Research Projects Agency (DARPA), the final design for the arsenal ship will not be made public until January 1998, only about two years prior to initial sea trials of the prototype ship. Until then, the most complete description of the ship lies in the Navy's CONOPS which outlines the following requirements:

- crew size of no more than 50,
- about 500 missile cells, capable of launching Tomahawk Land Attack Missiles (TLAM), a navalized version of the Army Tactical Missile System (NTACMS), the latest and emerging family of Standard Missiles (SM-2 Block IVA and LEAP), and possibly a surface-launched variant of the Standoff Land Attack Missile (SLAM),
- advanced gun system firing long-range guided munitions,
- Cooperative Engagement Capability (CEC) remote targeting and launch system,

- and an "affordable balance" of active and passive defense features against 21st century missiles, torpedoes and mines.

CURRENT EMPLOYMENT CONCEPT

The Navy's CONOPS envisions a force of "about six" arsenal ships forward deployed to the Southwest Asia/Persian Gulf, Western Pacific and Mediterranean theaters to provide the joint force commander with conventional deterrence, flexible response, and credible forward firepower, if deterrence fails, in support of joint and coalition land forces. Supportable roles include long-range strike, invasion stopping, fire support, tactical ballistic missile defense and air superiority. Peacetime Operational Control (OPCON) will be exercised by a numbered fleet commander, and joint force OPCON will be given to the Joint Force Maritime Component Commander (JFMCC). Tactical Control (TACON) will normally be exercised by a naval commander. AEGIS cruisers and destroyers will perform weapons control, mission planning, targeting and joint connectivity functions for the arsenal ships.⁸

A detailed analysis of the arsenal ship's possible utility in war was conducted during a Joint Multiwarfare

⁸ Ibid., 1-4.

Analytical Game (JMAG), and approved by a senior review board of retired general and flag officers from all four services.

Key findings include:

- "arsenal ship missions, doctrine, and basing policy should place deterrence first in all considerations.",
- long-range weapons (TLAM) are most effectively used early in conflict, and shorter-range weapons (NTACMS, SLAM, Strike-SM, naval gunfire) are most effectively used later in conflict, once sea and air control is achieved,
- the optimum weapons mix is theater dependent,
- and the forward presence of two arsenal ships can replace two to three days of aircraft strike assets, freeing some critical airlift for other needs just prior to and early in conflict.⁹

Joint Vision 2010

Focused on creating a more effective fighting force for the early 21st century, Joint Vision 2010 was devised to foster innovative ways to employ new and emerging technologies in support of four operational concepts; dominant maneuver, precision engagement, full dimensional protection, and focused

⁹Global Associates, Ltd., Technology Services Group, Joint Multiwarfare Analytical Game, Arsenal Ship Analysis, Executive Summary (Arlington, VA: 1996), 4-132.

logistics. Above all else, Joint Vision 2010 emphasizes the "imperative of jointness" in all future military operations.¹⁰ The arsenal ship measures up well with this plan for the future, espoused by the Chairman of the Joint Chiefs of Staff. It brings innovative solutions to many of the current problems faced by today's forces; however, it also brings some new problems to be resolved by future commanders. The following paragraphs highlight the positive and negative contributions of the arsenal ship to the future joint force, as measured against the four operational concepts of Joint Vision 2010.

Dominant Maneuver: ". . . the multidimensional application of information, engagement, and mobility capabilities to position and employ widely dispersed joint air, land, sea, and space forces to accomplish the assigned operational tasks."¹¹ This concept matures the process of maneuver warfare, emphasizing the need for forces capable of "conducting sustained and synchronized operations from dispersed locations."¹²

The arsenal ship provides the Joint Force Commander (JFC) with a powerful tool to support the land force's scheme of

¹⁰ U.S. Joint Chiefs of Staff, Joint Vision 2010 (Pentagon, Washington: 1996), 1-8.

¹¹ Ibid, 20.

¹² Ibid, 20.

dominant maneuver through close support and interdiction weapons. It can be particularly effective as an instrument of asymmetric leverage against an enemy with little or no maritime capability. While Joint Vision 2010 de-emphasizes the traditional methods of massing forces, the arsenal ship's large number of weapons allows the JFC to mass fires through rapid targeting and near simultaneous engagements with "massive" amounts of "ordnance on target." The huge initial punch provided by the arsenal ship will allow the JFC to gain an immediate offensive advantage and continue to exercise the initiative through maneuver and synchronization. The preponderance of weapons contained in the arsenal ship will also free other naval combatants to conduct other vital missions within the force, making the most efficient use of available forces.

Dispersal of forces is a key consideration for dominant maneuver, according to Joint Vision 2010. In the sense that the arsenal ship consolidates many weapons into one platform, it opposes the movement toward dispersal. This will reduce flexibility somewhat and make the arsenal ship a primary and perhaps vulnerable target for enemy forces. However, in the sense that the arsenal ship provides an additional platform

for large scale precision fires, interdiction, and close support, missions normally conducted by land and air forces, the ship may actually enhance dispersal of those forces. In order to overcome the inherent bulk of the platform, the JFC should employ methods to disperse the arsenal ship within the theater on a continual basis. Maneuver, stealth, and synchronization with land and air forces can make the arsenal ship a true "hit and run" platform, well suited to the fast-paced action prescribed in Joint Vision 2010.

Precision Engagement: ". . . a system of systems that enables our forces to locate the objective or target, provide responsive command and control, generate the desired effect, assess our level of success, and retain the flexibility to re-engage with precision when required."¹³ This concept seeks to take full advantage of the current and projected U.S. technological edge in weapons accuracy, precision, range, and platform stealth to extend the battlespace and better protect U.S. forces.

Incorporating the latest technology in precision weapons, the arsenal ship will be a key element in the "system of systems." The ship possesses no targeting, command and

¹³ Ibid, 21.

control (C2), or battle damage assessment capabilities, so maximum use of CEC to join other elements of the system is essential to successful employment. The Navy's CONOPS states that an AEGIS combatant will provide the C2 link to the joint force, performing all targeting, remote firing, and other C2 functions for the arsenal ship.¹⁴

While this may be necessary for the initial deployment period of the arsenal ship, the full development and joint use of CEC must be pursued. CEC will allow air and land force commanders to target and launch arsenal ship weapons directly, eliminating the "middle man" platform.¹⁵ Using an AEGIS combatant as a full time C2 escort is not only an inefficient use of a multi-mission platform, but could also negate the most effective survivability feature of the arsenal ship, stealth, if conducted from close range. C2 functions performed off-ship should be undertaken from as great a distance as feasible. The targeting and launching functions are also best performed by the commander using the weapons. JFACC for strike and JFLCC for interdiction and close support. The AEGIS combatant is best suited for control of the arsenal

¹⁴ U.S. Navy Dept., Arsenal Ship CONOPS, 4.

¹⁵ CAPT Richard L. Wright, USN, "Arsenal Ship: Potent and Punishing," Surface Warfare, January/February 1997, 22.

ship for theater missile defense only. Less reaction time and direct control by the force requiring support will improve efficiency and effectiveness. The goal should be to place as few steps between the customer and the provider as possible.

Unity and efficiency of command is a principal issue for successful joint operations, particularly with regard to the arsenal ship, since it will support multiple component and functional commanders. The Navy CONOPS states that, within a joint force, OPCON will reside with the JFMCC and that TACON will reside with a naval commander. To effectively control the arsenal ship's movements and primary tasking, the JFC should retain OPCON, eliminating the inevitable competition for resources between the component and functional commanders.

A possible solution for the tactical level of control of the arsenal ship lies in the apportionment of the weapons to the component and functional commanders. The Area Air Defense Commander (AADC) would own air and theater missile defense missiles, the JFACC would own deep strike weapons, and the JFLCC would own interdiction and close support weapons. This division of resources would allow the JFC to direct primary tasking, flexible enough for the rapid pace of future

conflicts, while also providing a measure of decentralized execution necessary for efficient mission accomplishment.

Full-Dimensional Protection: ". . . control of the battlespace to ensure our forces can maintain freedom of action during deployment, maneuver and engagement, while providing multi-layered defenses for our forces and facilities at all levels."¹⁶ This concept emphasizes proactive measures, built on information superiority, to degrade the enemy's opportunity for offensive action.

The arsenal ship can bring a large number of defensive weapons to a theater to enhance the protective posture of the joint force and shore facilities. While not contributing directly to information superiority, it can provide additional resources for the AADC, JFMCC, and JFLCC to execute their defensive plans and also to pursue the destruction of enemy command and control targets.

The arsenal ship brings with it an added consideration for the JFC: how to protect such a valuable platform. The greatest weakness of the arsenal ship concept is the lack of robust active defense systems for such a large concentration of firepower. Although designed to enhance passive defense

¹⁶ U.S. Joint Chiefs of Staff, Joint Vision 2010, 22.

measures (stealth, double hull construction, etc.), the arsenal ship's value to the joint force, as well as its value as a primary target for enemy forces, will necessitate a high level of attention to its protection. The Navy CONOPS states that an AEGIS combatant will provide a defensive escort for the arsenal ship. In light of the Navy's continued reliance on Aircraft Carrier Battle Groups and Amphibious Ready Groups for power projection,¹⁷ and the projected reduced number of combatant ships available,¹⁸ assigning a full time AEGIS escort for the arsenal ship may not always be possible. The JFC must pursue additional defensive options. Submarines could be used for surface and subsurface protection when an AEGIS ship with an embarked helicopter is not available, and aircraft (Navy or Air Force) could provide additional air defense. Innovative methods of operational deception, high levels of maneuverability, best use of the ship's reduced signatures, and the inherent toughness of the platform must be continually assessed and combined to maximize protection. The arsenal ship will be one of the most valuable platforms in the joint

¹⁷ U.S. Navy Dept., Forward . . . From the Sea, 4.

¹⁸ U.S. Navy Dept. Director of Surface Warfare, Surface Warfare Roadmap (Washington: 1996), 23.

force, and its protection must be a high priority at all levels of command.

Focused Logistics: ". . . the fusion of information, logistics, and transportation technologies to provide rapid crisis response, to track and shift assets even while enroute, and to deliver tailored logistics packages and sustainment directly at the strategic, operational, and tactical level[s] of operations."¹⁹

The arsenal ship could reduce the logistics requirements during a regional contingency conflict. As detailed in the JMAG report, weapons of deployed arsenal ships could replace 2-3 days of aircraft deep strike and interdiction assets early in such a conflict. The release of an equivalent amount of airlift required to transport the associated aviation support could be used for other vital needs. While realistically, the JFC would probably not forego an equivalent amount of aircraft firepower because of the presence of an arsenal ship or two, some aircraft could be directed to other targets or delayed in transport, lightening the early airlift requirements to some lesser degree. Later in the conflict, the arsenal ship moves closer to the land mass as air and sea control are achieved,

¹⁹U.S. Joint Chiefs of Staff, Joint Vision 2010, 24.

and its close support and theater missile defense weapons could replace land-based weapons systems (ATACMS, Patriot, etc.), further lightening the logistics load for their support. The key for the realization of any logistics savings will be in loading of the correct mix of weapons in the arsenal ship prior to deployment. Long term theater needs must be considered if the weapons brought to the theater will continue to meet the JFC's needs throughout the arsenal ship's deployment. The arsenal ship will also reduce the need for naval ammunition replenishment by traditional methods, because it will be able to transport, position, and fire additional weapons on the command of combatant forces who need them most. In fact, "the most efficient replenishment ship yet designed" could be the most accurate assessment of the arsenal ship's primary contribution to the joint force of the future.

CONCLUSIONS AND RECOMMENDATIONS

The arsenal ship concept is a powerful and versatile instrument for the Joint Force Commander to support nearly all aspects of joint military operations. Focused on primary missions, yet flexible in responsive options, this innovative platform can be used to create an immediate advantage and to seize the initiative from the start of armed conflict.

The operational concepts of dominant maneuver, precision engagement, full-dimensional protection, and focused logistics, defined by Joint Vision 2010, can be realized more fully with the arsenal ship in the fleet, although serious consideration must be given to resolving command and control issues and to providing full-dimensional protection for the arsenal ship. The Navy Concept of Operations should be revised to meet the needs as follows:

- Place the arsenal ship under the OPCON of the JFC in all joint operations. Maneuver decisions, primary tasking and protection responsibilities must be made from the operational or strategic perspective, with no single-service bias, and with irrefutable authority.

- Rely less on a continual escort by an AEGIS combatant for protection and joint connectivity. Develop the CEC concept to its full joint potential, allocating weapons to the arsenal ship's customers (AADC, JFACC and JFLCC) to exercise weapons release directly, cutting out the middle man, streamlining command lines and cutting reaction times.

- Develop additional options for surface combatant, submarine and aircraft protection for the arsenal ship. Reliance on an AEGIS combatant for full-time close protection

will not always be the most feasible, or even the most effective option.

With continued discussion and doctrinal development, the arsenal ship can provide a much needed force multiplier and powerful joint asset in the strategic, operational and tactical realms. As the final ship design takes shape, more refined solutions to doctrinal needs can be added, and further discussions of the best roles and missions can be pursued.

BIBLIOGRAPHY

- Anderson, LCOL Charles A., USA and COL Richard G. Kurtz, USA (Ret.). "Air and Missile Defense: Who's in Charge?" ADA, July-August 1996, 2-8.
- Beaumont, LCDR W., USN. "Counterair Is Still Dis Jointed." U.S. Naval Institute Proceedings, January 1997, 35-38.
- Bingham, LCOL Price T., USAF (Ret.). "It's the Best Thing Since Gunpowder." U.S. Naval Institute Proceedings, January 1997, 45-49.
- Blazar, Ernest. "Future Shock: Arsenal ship will have small crew & big punch." Navy Times, 29 July 1996, 12:1.
- _____. "How the Arsenal Ship Will Fight/Massive Precision Fire in a Hurry." Navy Times, 29 July 1996, 14:2.
- Carey, Merrick and Loren Thompson. "Submarines and the Future of Seapower." Strategic Review, Fall Supplement 19 October 1996, 6-15.
- Cate, LCDR David, USN. "Arsenal Ship, The Distributed Force, Force Planning and Innovation." Unpublished Research Paper, U.S. Naval War College, Newport, RI: 1996.
- Concian, COL Mark, USMCR. "The Revolution is Incomplete." U.S. Naval Institute Proceedings, September 1996, 70-73.
- Cushman, LGEN John H., USA (Ret.). "Joint Vision 2010: Can It Happen?" U.S. Naval Institute Proceedings, January 1997, 39-43.
- Friedman, Norman. "Stealth and Survivability." Jane's Navy International, July/August 1996, 10-14.
- Global Associates, Ltd. Technology Services Group. Joint Multiwarfare Analytical Game, Arsenal Ship Analysis Executive Summary. Arlington, VA: 1996.
- Hayes, CAPT Bradd C., USN and CDR Douglas V. Smith, USN, ed. The Politics of Naval Innovation. Research Report 4-94. Newport, RI: U.S. Naval War College. Strategic Research Department, 1994.

- Krejinevich, Andrew F., Jr. "Competing for the Future: Searching for Major Ellis." Marine Corps Gazette, November 1996, 28-37.
- _____. "Transforming the Navy's Warfighting Capabilities." Issues in Science and Technology, Fall 1996, 28-32.
- Metcalf, VADM Joseph, III, USN (Ret.). "Revolution at Sea." U.S. Naval Institute Proceedings, January 1988, 34-39.
- Moeller, CAPT R. T., USN. "JSTARS Works for Navy, Too." U.S. Naval Institute Proceedings, January 1997, 44.
- Myers, Chuck. "The Arsenal Ship--She's Long Overdue." U.S. Naval Institute Proceedings, September 1996, 81-82.
- Owens, ADM William A., USN. "The Emerging System of Systems." U.S. Naval Institute Proceedings, May 1995, 35-39.
- Patton, CAPT Jim, USN (Ret.). "Keeping up with the Revolution." U.S. Naval Institute Proceedings, July 1996, 39-42.
- Rosen, Stephen Peter. "New Ways of War: Understanding Military Innovation." International Security, Summer 1988, 134-168.
- Scott, Richard, Joris Janssen Lok, Barbara Starr, E. R. Hooton, and Vincent Grimes. "Arsenal Ship Takes Shape." Jane's Navy International, June 1996, 47.
- Smith, LT Neil A., USN. "Can the Arsenal Ship Survive?" U.S. Naval Institute Proceedings, January 1997, 80-81.
- Telephone conversation with CDR Cam Ingram, USN, Office of Chief of Naval Operations. Surface Warfare Plans, Programs and Requirements Branch, Pentagon, Washington. 9 January 1997.
- Trainor, Bernard E. "Anchors Awry: How to Fix the Sinking Navy." The Washington Post, 26 May 1996, C01.
- Truver, Scott C. "Budget Squeeze Blurs the Long-range Vision." Jane's Navy International, June 1996, 28-39.

U.S. Dept. of Defense. Director of Net Assessment. RMA Update. Memorandum for the Record. Washington: 1994.

_____. _____. Some Thoughts on Military Revolutions - Second Version. Memorandum for the Record. Washington: 1993.

U.S. Joint Chiefs of Staff. Doctrine for Joint Operations. Joint Pub 3-0. Washington: 1995.

_____. Doctrine for Joint Theater Missile Defense. Joint Pub 3-01.5. Washington: 1996.

_____. Joint Vision 2010. Washington: 1996.

U.S. Marine Corps. Operational Maneuver From the Sea. Washington: 1996.

U.S. Navy Dept. Arsenal Ship Concept of Operations. Washington: 1996.

_____. Forward . . . From the Sea. Washington: 1994.

_____. . . . From the Sea. Washington: 1992.

Wright, CAPT Richard L., USN. "Arsenal Ship: Potent and Punishing." Surface Warfare, January/February 1997, 21-23.